# MASTERY LEARNING THROUGH INDIVIDUALIZED INSTRUCTION: A REINFORCEMENT STRATEGY

By

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*ABSTRACT*

*The present study attempts to gauge the effect of individualized instructional methods as a reinforcement strategy for mastery learning. Among various individualized instructional methods, the study focuses on PIM (Programmed Instructional Method) and CAIM (Computer Assisted Instruction Method). Mastery learning is a process where students achieve the same level of content mastery but at different time intervals. It is an instructional philosophy based on the belief that all students can learn if given the appropriate amount of time and the appropriate instructional opportunities (Koul Lokesh and Sharma (1994)). The study has employed the conventional teaching method followed by the individualized instructional methods (as reinforcement strategies).*

*The study adopts the Quasi-experimental research method with 'Group at hand' sampling method. The samples are selected from three higher secondary schools in Tamil Nadu and Kerala (States in South India). After conducting three experimental phases the study concludes that individualized instructional methods (PIM & CIAM) are very effective as a reinforcement strategy for mastery learning.*

*Keywords: Mastery Learning, Individualized Instruction, Individual Differences, Programmed Instruction, Computer Assisted Instruction, Achievement, Cognitive Domain, Reinforcement.*

## INTRODUCTION

The heavy curriculum load at the Higher Secondary School Level (+2 level) compels the teachers to cover the course content in a hurry. Teachers often stick to lecture method to cover more content in a short time and as a consequence, many planned educational objectives especially those of higher order cognitive domain remain unachieved. The concentration is more on dispensing of knowledge to the students rather than in finding out if the students have comprehended what the teacher has tried to pass on to them. As the teachers are not getting enough time to cater to the individual differences in the class, the slow learners and the under achievers are much affected and may be held back from mastering the subject taught [NCERT (1998)]. Students in the classroom are geared towards the loading off actual knowledge, as sufficient opportunity could not be given for developing their intellectual skills and enhancing the critical thinking, reasoning and problem-solving abilities. Revision of the lessons also could not be done in the classroom due to shortage of time and in turn it affects the mastery and retention (remembering) of facts and concepts [Ahuja Malvinder (2000]. Hence we have to search for new supplementary or complementary teaching-learning strategies which will enable the students to reinforce and master the content in a short time and more effectively.

Mastery learning emerged as a result of the continuous and tireless efforts of educational researchers in finding the solutions to these and other related issues. In its simplest form, mastery learning refers to learning in which almost all learners are made to achieve what the best students would normally achieve in the traditional classroom teaching. By providing enough time and a type of instruction suiting the needs of individual learners, every student can be made to master the concepts taught. Every student continues to receive instruction till he shows the predetermined performance level. Like any other individualized instructional approaches, mastery

learning approach also provides instructional setting that will accommodate a diversity of students. An attempt is made in this approach to modify instructional setting, so that the students possessing a variety of entry abilities, skills, knowledge, attitude and values, can succeed [Koul Lokesh and Sharma (1994)].

There are two main types of mastery learning, teacher-paced / group-based and learner-paced / individual-based. The later type of mastery learning is learner-paced and individual-based. As the terms suggest, the flow and delivery of the instructions is decided by the individual learner. In our set up, where there is a prescribed syllabus to be completed by each student and a final external examination, complete individualization seems to be difficult, but the use of individualized or self-instructional strategies as a supportive or reinforcement system to the conventional method of teaching may be more practical and effective [NCERT (1998)]. Use of Computer Assisted Instruction (CAI) and Programmed Instruction (PI) as a reinforcement system, benefits the slow learners in the classroom. It can also benefit the high achievers in the class, who are frequently prevented from moving ahead in the traditional teaching situation. The research also suggests that the CAI and PI can improve the student performance, particularly if used individually or in combination with other techniques. Immediate feed back provisions in CAI and PI, helps the students to verify their learning and master their learning.

In the present study, an effort has been undertaken to study the individualized instructional methods viz. CAIM (Computer Assisted Instruction Method) and PIM (Programmed Instructional Method) as a reinforcement strategy to support and to complement traditional teaching to master the learning.

### Design of the Study

The major objective of the present study is to see the effect of PIM and CAIM as reinforcement strategies to complement the conventional teaching on Mastery learning. Considering the above, the investigators decided to have Quasi-experimental research method to undertake this study. The data were generated through manipulation of the methods at different phases.

### Population and Sample of the Study

The investigators selected the students from three Higher Secondary Schools from Coimbatore (Tamil Nadu) and Calicut (Kerala). These schools are Lisieux Hr. Sec. Sechool and Bharathi Mat. Hr. Sec. School, Coimbatore, and Govt. Hr. Sec. School, East Hill, Calicut. The investigators have adopted 'group at hand sampling method' for the selection of Standard XII students from the identified population of the present study. The investigators have undertaken the experimental study on 178 XII standard students of the three Schools.

### Development of Instructional Material and Tools for the Study

The investigators have developed the individualized instructional packages i.e., Programmed Instructional Materials and Computer Assisted Instructional packages of the selected subject content in 'Genetics', based on the XII standard syllabi. Based on the selected subject content in 'Genetics', five programmed Instructional Modules were prepared in non-linear style.

The programmed Instructional Modules are converted into CAI packages on tutorial mode, with the help of 'C' computer language. A pilot study was carried out to validate the above mentioned instructional packages. The investigators have also developed and validated the following tools to generate the data for the present study:

- CAI Software evaluation proforma
- Criterion Referenced Test (CRT) with 50 multiple choice items.

A pre-study was carried out for validation of the items in the CRT and establishing the validity and reliability of the tools employed for the present investigation.

#### *Study Phases*

The present study involves the following phases.

*Phase I: Identification and Development of Self-Instructional Packages and Tools*

In this phase, the investigators have developed the Programmed Instructional Modules, Computer Assisted

Instructional software, Lesson Plans, Criterion Referenced Tests (Mastery learning Test) and Proforma to evaluate CAI software etc. Pilot study for the validation of self-instructional packages and pre-study for validation of CRT and to establish validity and reliability of the tools were also undertaken at this phase.

*Phase II: Experimental Phase 1*

In this phase, by using the CRT, the pre-test (Test-1) is conducted on the sample selected from Standard XII. The investigator taught the unit 'Genetics' by conventional Method of teaching. The topic is covered within five days, each unit on Genetics covered by taking one contact session of 45 minutes per day. On completion of the five topics in Genetics, an achievement test (Test-2) is administered with the help of CRT. After a gap of 30 days, a mastery learning test (Test-3) is conducted by using the same CRT.

*Phase III: Experimental Phase 2*

At this stage, the students are randomly divided into three groups to form the control and experimental groups. The students of experimental group-1 are given reinforcement through Programmed Instructional Modules and experimental group-2 received reinforcement through Computer Assisted Instructional Packages for a duration of five teaching sessions in a single day with a gap of 20 minutes each between the modules. The students of the control group are not given any such reinforcement. After giving reinforcement to the experimental groups, CRT (Test-4) is administered to all the groups of the study. After a gap of 30 days, a final mastery learning test (Test-5) is also conducted by using the CRT.

### Coding and Analysis of Data

Thus, data collected from different phases of the study with the help of CRT is screened and coded with appropriate coding technique.

### Results and Discussions

The generated data at the different test phases are coded and subjected to statistical analysis. Based on the analysis, the Tables 1 and 2 present the results of the PIM group on Mastery Learning.

Table 1 shows the mean and standard deviation of Control and Experimental group of PIM at different test phases.

From the Table 1 and 2, it is clear that between the test phase 1 and 2 has a substantial increase in cognitive skills due to conventional teaching. However, there is also substantial loss of cognitive skills at the test phase 3, which clearly indicates the conventional teaching does not help the students to retain and master their content. Hence, it requires a reinforcement strategy to master the content. Between the test phases 3 and 4, the study has manipulated PIM as an individualized instruction as a reinforcement strategy, which has also proved from the mean score of the test 5. The test-5 mean score clearly indicates that obtained mean score at test-5 is more or less equal to the mean score at the test 2 phase, which presents the students were able to retain and master the amount of cognitive skills learnt through conventional method.

Table 3 shows the mean and standard deviation of Control and Experimental group of CAI at different test phases.

Similar results are also obtained as that of PIM group in the Table 3 and 4 of the CAIM group. This result also proved

| Tests | N | Mean | SD |
|---|---|---|---|
| Test – 1 | 56 | 23.93 | 8.88 |
| Test – 2 | 56 | 59.11 | 15.65 |
| Test – 3 | 56 | 32.48 | 13.16 |
| Test – 4 | 56 | 69.14 | 14.32 |
| Test – 5 | 56 | 55.29 | 15.68 |

Table 1. Mean Score and Standard Deviation of PIM group at different Test Phases

| Tests | N | Difference in Mean | SD | T-value | Level of Significance |
|---|---|---|---|---|---|
| T1 – T2 | 56 | 22 | 6.59 | 9.05 | 0.01 level |
| T1 – T3 | 56 | 13 | 4.98 | 7.10 | 0.01 level |
| T1 – T4 | 56 | 26 | 5.76 | 12.26 | 0.01 level |
| T1 – T5 | 56 | 21 | 5.91 | 9.63 | 0.01 level |
| T2 – T3 | 56 | 10.40 | 6.39 | 4.40 | 0.01 level |
| T2 – T4 | 56 | 6.00 | 3.23 | 5.03 | 0.01 level |
| T2 – T5 | 56 | 4.00 | 3.28 | 3.30 | 0.01 level |
| T3 – T4 | 56 | 15.00 | 6.00 | 6.75 | 0.01 level |
| T3 – T5 | 56 | 9.00 | 6.14 | 4.00 | 0.01 level |
| T4 – T5 | 56 | 6.00 | 3.28 | 4.08 | 0.01 level |

Table 2. T-value for PIM group at different Test Phases

| Tests | N | Mean | SD |
|---|---|---|---|
| Test – 1 | 56 | 24.18 | 9.13 |
| Test – 2 | 56 | 58.43 | 16.25 |
| Test – 3 | 56 | 35.71 | 17.14 |
| Test – 4 | 56 | 71.20 | 14.70 |
| Test – 5 | 56 | 56.89 | 16.99 |

Table 3. Mean Score and Standard Deviation of CAI group at different Test Phases

| Tests | N | Difference in Mean | SD | T-value | Level of Significance |
|---|---|---|---|---|---|
| T1 – T2 | 56 | 21 | 6.88 | 8.30 | 0.01 level |
| T1 – T3 | 56 | 13 | 6.39 | 5.53 | 0.01 level |
| T1 – T4 | 56 | 27 | 6.12 | 10.15 | 0.01 level |
| T1 – T5 | 56 | 22 | 6.67 | 8.94 | 0.01 level |
| T2 – T3 | 56 | 7 | 4.97 | 3.82 | 0.01 level |
| T2 – T4 | 56 | 5 | 4.25 | 4.25 | 0.01 level |
| T2 – T5 | 56 | 3 | 2.65 | 2.65 | NS |
| T3 – T4 | 56 | 14 | 4.17 | 4.17 | 0.01 level |
| T3 – T5 | 56 | 9 | 4.12 | 4.12 | 0.01 level |
| T4 – T5 | 56 | 5 | 3.48 | 3.48 | 0.01 level |

Table 4. t-value for CAI group at different Test Phases

that CAIM as a reinforcement strategy helped the students to master their content learnt through the conventional teaching method.

## Conclusion

With the present infrastructure, curriculum, class size, availability of teachers, etc., it is difficult to achieve and fulfill the heterogeneous learners' needs and educational objectives. Further, most of the teachers' use the traditional teaching method, which does not have potentialities of achieving mastery learning. Since, the objectives of classroom teaching are multi dimensional in nature, their achievement could be realized through integrated instructional method.

In the present study, an effort has been undertaken to study the individualized instructional methods viz., PIM and CAIM as a reinforcement strategy to support and to complement traditional teaching to master the learning. The results and findings of the study concludes that both the PIM and CAIM as are reinforcement strategy to master the content effectively and individualized instructional methods could be used as reinforcement strategy for mastery learning.

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